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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,804	02/18/2004	Jianhua Huang	01640396AA	6824
30743	7590	08/28/2006	EXAMINER	
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C. 11491 SUNSET HILLS ROAD SUITE 340 RESTON, VA 20190			POULOS, SANDRA K	
			ART UNIT	PAPER NUMBER
			1714	

DATE MAILED: 08/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/779,804	HUANG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Sandra K. Poulos	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) 1-20 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/6/04</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-9, drawn to a composite material, classified in class 524, subclass 495.
  - II. Claims 10-20, drawn to a method of manufacturing fuel cell bipolar plates, classified in class 429, subclass 12.

The inventions are independent or distinct, each from the other because the inventions in Group I and II are related as a process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case Group I is a composite material that can be made by other processes than that specified in Group II, such as being extrusion molded into anything other than bipolar plates, for instance, a plastic bottle.

Because these inventions are distinct for the reasons given above, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Michael Whitham on August 15, 2006 a provisional election was made with traverse to prosecute the invention of Group II, claims 10-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-9 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Specification***

2. The disclosure is objected to because of the following informalities: page 8, line 11 recites "formed y the wet-lay process" which is unclear. Page 9, line 10, the sentence is missing a period.

Appropriate correction is required.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 10-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 4-9, 12-13 of copending Application No. 11/244,401 (published as US 2006/0084750). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following explanation.

The claims of copending Application No. 11/244,401 disclose a method of manufacturing fuel cell bipolar plates, comprising the steps of: forming a composite material comprising a core formed from graphite particles, thermoplastic fibers, and reinforcing fibers, said composite material having at least one outer layer positioned on said core comprising one or more polymers and graphite particles; and molding said composite material and said at least one outer layer to form at least one bipolar plate. The claims of the current application disclose a method of manufacturing fuel cell bipolar plates, comprising the steps of: forming a composite material comprising graphite particles, thermoplastic polymer, and reinforcing fibers, wherein the bulk conductivity is at least 150 S/cm; and molding said composite material to form bipolar plates.

The claims of 11/244,401 do not disclose a bulk conductivity of at least 150 S/cm; however, the specification discloses that the composite preferably has a bulk conductivity of at least 150 S/cm (para 15, 32) and thus it would have been obvious to

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one of ordinary skill in the art to require that the bulk conductivities meet those specified in the disclosure.

Applicant's attention is drawn to M.P.E.P. § 804 where it is disclosed that "the specification can always be used as a dictionary to learn the meaning of a term in a patent claim." *In re Boylan*, 392 F. 2d 1017, 157 USPQ 370 (CCPA 1968). Further, those portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in an application defines an obvious variation of an invention claimed in the patent. *In re Vogel*, 422 F. 2d 438, 164 USPQ 619, 622 (CCPA 1970).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 10-11, 13-15, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Balko et al (US 4,339,322).

Balko discloses bipolar plates that comprise a molded aggregate of conductive particles and a thermoplastic fluoropolymer binder reinforced with conductive reinforcing elements (col 1, lines 24-29; col 2, lines 56-65). The conductive particles are preferably graphite and the conductive reinforcing elements are conductive carbon fibers (col 1, lines 63-67). The bulk resistivity of the bipolar plate is less than  $4 \times 10^{-3}$  ohm-inches, particularly from  $1.9$  to  $3.5 \times 10^{-3}$  ohm-in, which is analogous to a bulk conductivity of 112 to 207 S/cm (see online conversion sheet) (col 2, lines 15-21; examples). PTFE and polyvinylidene fluoride resins are used as the fluoropolymer (col 2, lines 29-40). There are also conductive projections providing parallel fluid distribution channels for fluids and gaseous electrolysis products (col 4, lines 1-6; col 8, lines 42-49). The composition blended and then compression molded (col 6, lines 46-48). The bipolar plates are in the form of stacks (col 3, line 68).

Therefore, Balko anticipates the cited claims.

5. Claims 10-11, 13-14, 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Butler (US 6,752,937).

Butler discloses a composition for fuel cell bipolar plates that comprises graphite, polymer, and silver coated ceramic fibers (abstract; col 3, lines 59-61). Products molded from the composition have a bulk conductivity of at least 70 and up to 170 or more S/cm (col 1, lines 15-17). The molding resin composition contains an unsaturated polyester resin or vinyl ester resin; "Resin D" is a polyester used in the examples (col 4, lines 27-29; examples). The filler is graphite in order to impart electrical conductivity to the final

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molded product (col 4 line 64 to col 5 line 3). Silver coated ceramic fibers also improve the overall electrical properties and would inherently be reinforcing although additional fibrous reinforcing agents may additionally be added such as glass fibers (col 5, lines 12-14; col 7, lines 47-48; col 14, lines 9-12). Carbon nanofiber is used in the examples (col 15, lines 7-8; examples). The composition is molded by compression, transfer, or injection molding (col 8, lines 30-33). The plate has fluid flow channels and a pattern molded onto it (col 9 line 62 to col 10 line 23). The forming and molding step occur sequentially (col 15, lines 18-20).

Thus, Butler anticipates the cited claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 12,16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balko et al (US 4,339,322) as applied to claims 10-11, 13-15, 19 above, further in view of Tucker et al (US 5,614,312).



The discussion with respect to Balko in paragraph 4 above is incorporated herein by reference.

Balko does not disclose (1) forming the bipolar plates using the wet-lay process or (2) depositing a second polymer on a top and bottom of the stack.

Tucker discloses compression molded thermally and electrically conductive plaques made from thermoplastic polymer, graphite particles and reinforcing fibers (abstract). The wet laid sheet materials are stacked together to produce a thickness suitable for compression molding to form the plaques which result in excellent conductivity (col 1, lines 52-55; col 4, lines 8-14; col 7, lines 18-22).

With regard to (1), it would have been obvious to one of ordinary skill in the art to use the wet-lay process described by Tucker to form the bipolar plates in Balko since the wet-lay process yields plates that have improved conductive and electrical properties. Also, since graphite is a component of the stack, it is considered that it has been broadly "added" to the stack.

With regard to (2), it would have been obvious to one of ordinary skill in the art to use a separate polymer on a top and bottom of the stack because there are different temperature distributions at the central layers compared to the outermost layers and therefore it would be advantageous to separately use polymers that have different heat resistance properties in order to ensure good heat distribution.

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7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Balko and Tucker as applied to claims 10-17, 19 above, and further in view of Niu et al (US 2003/0089890).

The discussion with respect to Balko and Tucker in paragraph 6 above is incorporated herein by reference.

Balko and Tucker do not disclose forming a core of the composite and having a layer of a different polymer on the surface.

Niu discloses an electrically conductive composite comprising a polyvinylidene fluoride polymer and carbon nanotubes (abstract). Carbon fibrils or fibers can be added to the composition to increase tensile and flexural characteristics (para 18-19). Fillers such as graphite may also be used with PVDF copolymer composites (para 4). The composite is used for bipolar plates (para 56). Nui describes a multilayered structure comprising a first layer of a PVDF composite, a second layer of a thermoplastic or thermoplastic blend/composite, and an optional third adhesive layer between the first and second layers. The second layer can be a nylon-clay composite known for excellent barrier and high heat distortion properties, or a nylon blend. This layered structure can be fabricated in a sheet form, the inner layer preferably a PVDF composite layer (para 96).

It would have been obvious to one of ordinary skill in the art to include a second polymer layer in the composite by Balko/Tucker in order to modify or increase barrier and high heat distortion properties, as preformed by Niu.

**Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2006/0027792 discloses a composite that contains graphite, thermoplastic fibers, and carbon fibers wherein the composite has an electrical conductivity of at least 150 S/cm.

US 2003/0203266 discloses a bipolar plate containing graphite particles and resin wherein the composition has an electric conductivity of about 500-1000 S/cm.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sandra K. Poulos whose telephone number is (571) 272-6428. The examiner can normally be reached on M-F 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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